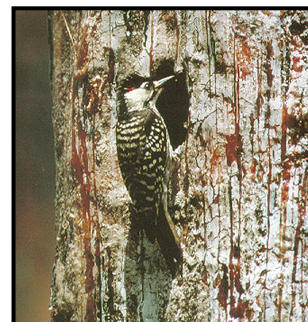


Red-Cockaded Woodpecker Model: Object-oriented, Individual-based, Spatially Explicit Simulation

What is a Red-Cockaded Woodpecker (RCW)?

Listed as a federally endangered species since 1970, the Red-Cockaded Woodpecker (*Picoides borealis*) (RCW) is a resident of the old-growth longleaf pine woodlands of the southeastern United States. Because federal land-owning agencies, such as the Department of the Army, are required to carefully manage for federally listed endangered species, decision support tools are needed to assist such agencies in meeting these legal and policy requirements.



How are Red-Cockaded Woodpeckers modeled?

Argonne National Laboratory has implemented an individual-based, spatially explicit model of RCWs based on Letcher, et al. (1998.)* The model is developed using Argonne's model integration framework called the Dynamic Information Architecture System (DIAS), which captures the properties and behavior of individual birds, their population groups, and their territories. Argonne has expanded the basic model to include a land manager object that installs artificial nest boxes and removes a certain amount of birds during the simulation. The model requires spatial data representation of forest inventory and RCW cluster locations, as well as initial RCW population information (ID, gender, age).



What's new?

Because DIAS provides an adaptive and incremental way to build customized tools for addressing complex interactions for specific installations, other legacy models can be integrated to provide additional behavior to the system. Ongoing development includes the integration of tools for representing the forest dynamics of growth, disease, and forest management. These models will allow the simulated RCWs to react to changes in their habitat.

What are the model outputs?

The spatial output of the simulation is dynamically displayed by using the ANL-developed JeoViewer. During simulation, objects can be queried to display information on the status of an individual bird or territory. Charts and graphs are also available to display model statistics, such as population size, number of territories with breeding pairs, or total number of new fledglings.

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* Letcher, B.H., J.A. Priddy, J.R. Walters, and L.B. Crowder. 1998. An Individual-based, Spatially-Explicit Simulation Model of the Population Dynamics of the Endangered Red-Cockaded Woodpecker, *Picoides borealis*. Biological Conservation 86: 1-14.